LOUISIANA STATE UNIVERSITY

ANNOUNCEMENT OF THE

AUDUBON SUGAR SCHOOL

1909-1910

BATON ROUGE, LOUISIANA.

LOUISIANA STATE UNIVERSITY—AUDUBON SUGAR SCHOOL.

Irion Hall, Chemical Laboratory.

UNIVERSITY BULLETIN

LOUISIANA STATE UNIVERSITY

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AUDUBON SUGAR SCHOOL

BATON ROUGE, LA.

The courses of study have not been materially changed since this bulletin was issued.

BATON ROUGE
THE NEW ADVOCATE, OFFICIAL JOURNAL
1909

THE OAKS.
Audubon Park, New Orleans.

AUDUBON SUGAR SCHOOL

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LOUISIANA STATE UNIVERSITY—AUDUBON SUGAR SCHOOL.

Experiment Station, Sugar House and Cane Plots, Audubon Park, New Orleans.

LOUISIANA STATE UNIVERSITY

THE AUDUBON SUGAR SCHOOL

The Audubon Sugar School was established in 1891 by the Sugar Planters' Association of Louisiana in conjunction with the Louisiana State University. The Sugar Experiment Station of the University had been established a few years previously at Kenner, La., whence it was shortly removed to Audubon Park, New Orleans. The Experiment Station was organized by Dr. W. C. Stubbs, under whose direction a model experimental sugar house was erected and many varieties of cane planted, all on a scale large enough to represent correctly commercial practice. The remarkable results reached in Europe in the beet sugar industry had been reached by a rigorously scientific study of the agriculture of the beet, the chemistry of the manufacture of beet sugar and its by-products in the sugar house and the engineering principles employed in the application of the chemical principles. These methods it was resolved to apply to the study of the cane sugar industry in Louisiana.

It soon became evident that valuable data were being accumulated rapidly, but that these data could not be applied practically by any one save a man specially trained in scientific cane sugar engineering, which training was not to be obtained in any existing university. The Sugar Planters' Association accordingly agreed to aid in financing such a school, if Dr. Stubbs would undertake its direction. In 1891 the Audubon Sugar School was opened with a faculty of the ablest specialists to be found in this country or abroad. Its success was so great that in 1897 the increasing duties connected with its management and the growing magnitude of the Sugar Experiment Station work compelled Dr. Stubbs to retire from the active directorship. The school was then incorporated with the State University, preserving the name by which it had

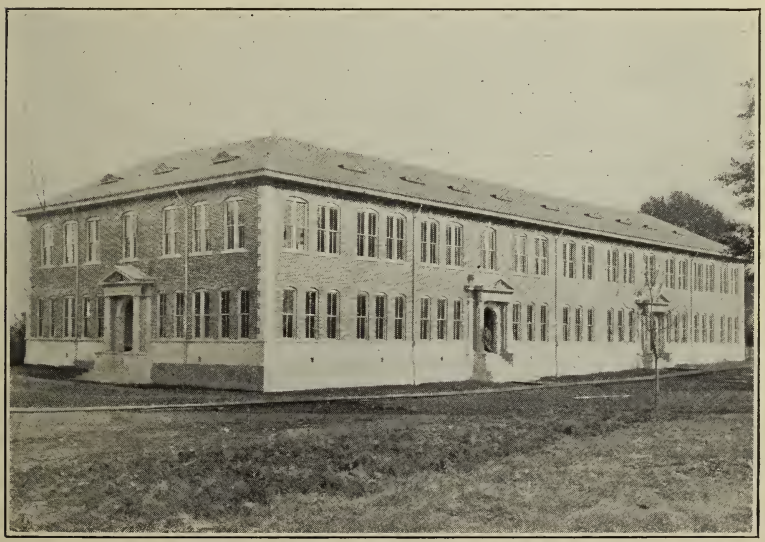
become so well known. In 1908 it was reorganized as a college of the University.

The primary purpose of the school is to offer to the citizens of Louisiana an opportunity to secure such training as will qualify them to enter most advantageously the sugar industry in this State. The underlying idea, therefore, is to train men who should be competent to manage plantations which both grow cane and make sugar. To this end a course of study has been formulated, running through five collegiate years, and including chemistry, agriculture, mechanical engineering and sugar making. Before the study of sugar chemistry proper, sugar agriculture or sugar house engineering can be undertaken profitably, a thorough preliminary course is necessary. It is impossible to become a sugar chemist until the principles of chemistry are mastered, or to become a sugar engineer until mathematics, drawing and the principles of mechanics have been acquired. Men lacking the necessary foundations, find it increasingly difficult to build thereon a successful career in applied science.

In the case of sugar engineering, this preliminary training is so special that students can not always obtain it at other institutions. The first three years of the Audubon Sugar School aim to give the training desired.

The course of the last two years of the Sugar School is essentially a professional course and may also be taken by such graduates or advanced students in this or other institutions as may be prepared to take advantageously the work offered. It includes work in the study and design of sugar house machinery, in sugar chemistry and methods of sugar analysis, and in the special agriculture of the sugar cane. Its distinguishing feature is the practical work in the field and in the sugar house required during two full sugar seasons at the Sugar Experiment Station, Audubon Park, New Orleans. Somewhat before the opening of the sugar campaign, a date which varies with the season, the students leave the University under the charge of a special instructor and report to the Assistant Director of the Sugar Experiment Station at Audubon Park. The instructor remains with the students until the

LOUISIANA STATE UNIVERSITY—AUDUBON SUGAR SCHOOL.
Heard Hall, Laboratory for Electrical Engineering.



LOUISIANA STATE UNIVERSITY—AUDUBON SUGAR SCHOOL.
Robertson Hall, Laboratory for Mechanic Arts.

season is over. Under his supervision the students work through a scheme of carefully considered studies in agriculture, chemistry and sugar house engineering, formulated by the heads of the corresponding departments in the University. Every Saturday during the sugar season, the Dean of the Sugar School or the Professor of Mechanical Engineering visits the Station, inspects the work done and lays out the work for the next week. The following is an outline of the course followed by the students at Audubon Park, drawn up by the professors in charge of the subjects mentioned.

AGRICULTURE.

The fourth and fifth-year sugar students are expected to report to the Park in time for the planting of all experiments in cane conducted by the Sugar Experiment Station, where they make a study of the purposes of the experiments and assist in every way possible in the planting. In fact, much of he actual planting is done by the students. For instance, thee is an experiment in which is being tested the hereditary effet of planting cane tops with comparatively immature buds, cane butts having the most mature buds of the stalks, and the middles. The plot devoted to continuous planting of tops represents now the accumulated inheritance, whatever that may be, of some ten or twelve years; the data on tonnage, sugar content, and vitality of the cane are available to the student, and he is expected to study these results, at the same time helping in the selection of the different portions of the cane to be planted. The same is true of the other divisions of this experiment.

In studying the varieties of the cane, students take notes on the general characters of the more important varieties and those that have distinctive features, and actually help in stripping, topping and cutting the canes, weighing them, and selecting stalks for analysis in the laboratory, computing the data desired in regard to these varieties, etc. They are expected also to make notes and observations on the field results of the application of fertilizers; to assist in determining the number of suckers and their ages, on the plots where expe-

riments are conducted for studying the conditions that influence the suckering of cane; and to make a study of the field conditions of plant cane, first year stubble and second year stubble, as to stand, maturity, etc.

They are generally expected to participate in the sowing of fall crops of forage, alfalfa, clovers, vetches, etc. It is further desired that they will make a full study of the sugar cane borer and other insect enemies of sugar cane.

CHEMISTRY.

The student goes to the Park with a knowledge of the principles of sugar analysis, including the use of the polariscope and the estimation of reducing sugars. He there makes complete technical analyses of cane, bagasse, juice, syrup, molasses and sugar—determining sucrose, glucose, glucose ratio, real and apparent purity, etc. After he has learned to make the usual analyses with accuracy, he is called upon to exercise a chemical control of the sugar house. To this end, he takes samples from the practical work of the sugar house at Audubon Park and is made to calculate the chemical and mechanical loses incident to each run. Given a definite amount of cane, he is required to find out the extraction, and the effects upon extraction of saturation between the rolls; to analyze the juice; to determine the total sugar therein and the amount lost in clarification, evaporation and filtration, the mechanical and chemical losses in the effects and the vacuum pan, the sugar left in the molasses, etc. In short, he must make a detailed and systematic chemical and mechanical control of the sugar house and the entire process of sugar making. From the data thus obtained he fills out a printed blank report, which is submitted to the instructor for inspection. This report is modeled after the reports made use of in the actual work of the best sugar houses in Louisiana, Cuba and elsewhere. Particular attention is paid to the calculation and interpretation of the laboratory data. The amount of practice obtained in this line of work is sufficient to enable the student to fill a commercial position with confidence, both in the accuracy and in the rapidity of his work.

LOUISIANA STATE UNIVERSITY—AUDUBON SUGAR SCHOOL.
Laboratory for Experimental Engineering.

LOUISIANA STATE UNIVERSITY—AUDUBON SUGAR SCHOOL.
Lecture Room, Sugar Chemistry.

In addition to the above, investigations are being continually carried on by the staff of the Station, which the student is expected to follow with care, and, where possible, to participate in. These are for the most part devoted to methods of sugar analysis, to the separation and estimation of the various compounds found in sugar cane and its by-products, to the testing of new methods proposed for sugar house work, to sugar house bacteriology, to fermentation and alcohol production, and to such other problems as may arise from time to time.

SUGAR HOUSE ENGINEERING.

The work along this line is designed, first, to give the student a practical knowledge of different mechanical operations concerned in the manufacture of sugar, and, secondly, to teach him the more important engineering problems peculiar to sugar house machinery through experimental research.

In both cases the student learns by actually doing tasks assigned.

Before the grinding season begins, the students are required to overhaul the entire sugar house, cleaning and repairing all the machinery. After the grinding begins each student, in his turn, is assigned charge of the different parts of the house, such as boiler room, cane mill, sulphuring machine, clarifiers, filter presses, double effect evaporators, vacuum pan, centrifugals, etc., each of which he must operate himself, also giving attention to various auxiliary apparatus, such as steam engines, vacuum pumps, water pumps, etc.

The experimental work is devoted to making various tests upon the machinery and to sketching and measuring the same in order to learn the proportions and construction of the different parts. The experimental work includes tests to determine the thermal efficiency and capacity of a double effect with varying conditions of steam pressure, vacuum and height of juice level; the power required to run the mill with varying quantities and kinds of cane per unit of time; the energy required to operate centrifugals with different masse cuites and different periods of acceleration; the capacity of a filter press with varying pressures, kinds of material filtered, and kinds

of cloth; the thermal efficiency and capacity of a vacuum pan under different conditions of steam pressure and vacuum; the steam consumption of an open pan clarifier. Tests of the boilers are also made, and a daily record of the fuel burned is kept in order that the economics of the plant as a whole may be studied.

Students of this course are also given the opportunity to take part in experimental tests of sugar house machinery, which are carried on each grinding season in sugar houses of the State by members of the Experiment Station staff.

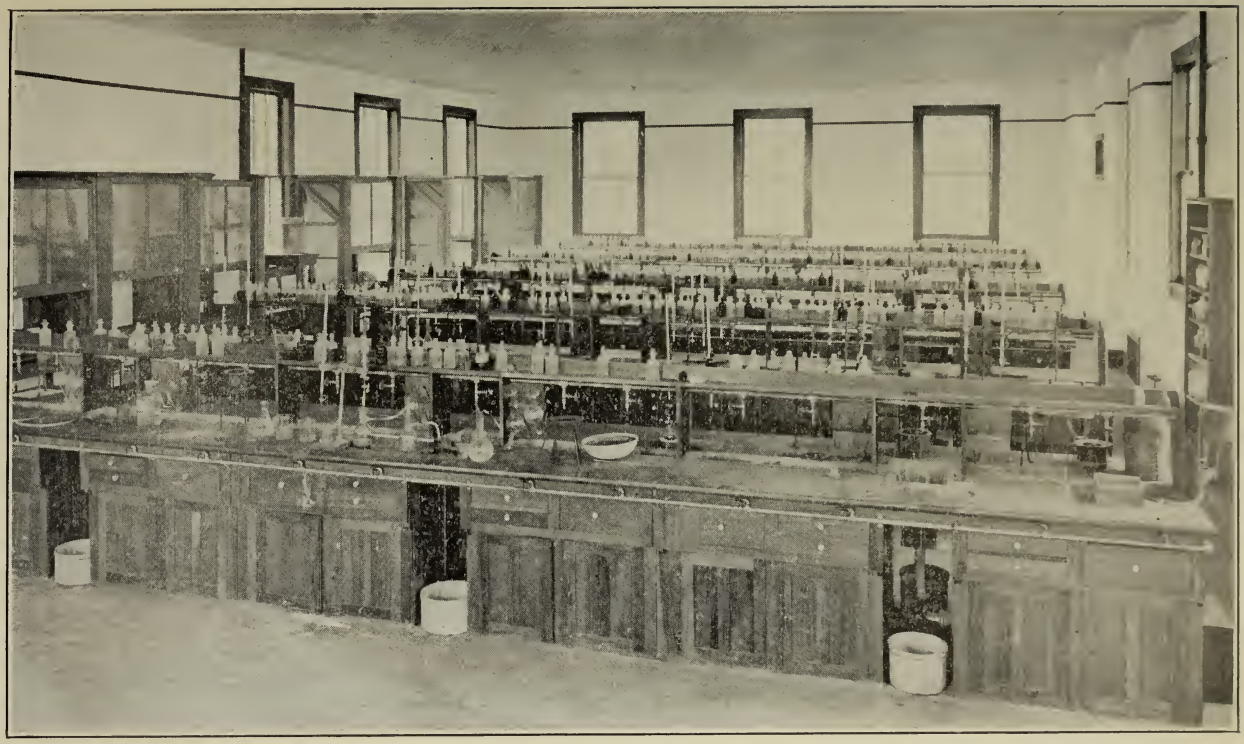
EQUIPMENT.

The Station possesses an excellent library, devoted particularly to the literature of sugar and sugar chemistry. Students can thus be referred to original articles and are expected to make use of them in preparing reports.

The material equipment of the Station is valued at about one hundred thousand dollars. It consists of a well equipped sugar house, fields of cane, including all the well-known varieties and many yet in the experimental stage; large and very complete laboratories both for chemical control, and for chemical and bacteriological research. The fields illustrate various forms of drainage, including tile drainage. The sugar house contains a nine-roller mill; a complete diffusion plant with several kinds of cutters and comminutors; Horsin-Déon and Baldwin's juice weighers; clarifiers; filter-presses; double effects; vacuum strike pans; centrifugals; water, air and vacuum pumps; juice and syrup tanks; sugar wagons; sugar shaker; a crystallizer for crystallization in motion; a hot room; and a boiler house, with boilers, engines, etc.

The foregoing is an account of the work in the regular course of the sugar school. Its main aim is to prepare sugar experts. Its second aim is to give to those who do not wish the full course partial instruction in the different departments of sugar growing and manufacture. Therefore, irregular students are received in the following departments: Agriculture, Mechanics, Chemistry, Drawing, and Sugar-making.

Special courses along any of the above lines are offered to such students as may be lacking either in the time or the prepa-



LOUISIANA STATE UNIVERSITY—AUDUBON SUGAR SCHOOL.
Laboratory for Quantitative Analyses.

ration necessary to complete the full course of the sugar school, provided their previous training qualifies them to enter the classes they may select.

The above courses have been planned especially to meet the wants of Louisiana sugar planters, but are open also to students from other states or from foreign countries.

As at present formulated, the course of the Audubon Sugar School accentuates the chemical and the mechanical sides of the making of sugar. Students desiring to lay more stress on the agricultural side than the present course demands will be permitted to substitute agriculture for either the whole or part of the chemical or mechanical work required in the fourth and fifth years. The courses in agriculture must be chosen from those given in the College of Agriculture or from special courses arranged to suit specific requirements.

REQUIREMENTS FOR ADMISSION TO THE AUDUBON SUGAR SCHOOL.

Every applicant for admission to the University must be of good moral character and at least sixteen years of age (at nearest birthday); but for students who are well prepared to enter the Freshman class the age limit may be waived.

Students are admitted upon examination or the presentation of satisfactory certificates in the following subjects:

	Units.
English	3
Algebra, through Quadratics	2
Plane Geometry	1
French, German or Spanish	1
History	1
Elective	4
Total	12

The term unit means a high school subject pursued for five hours per week for one year. Applicants not fully prepared may enter with conditions in not more than three units.

Students preparing for entrance are advised to pay special attention to elementary mathematics. Weakness in this subject is the commonest cause of subsequent failure.

Applicants over eighteen years of age will be admitted to special courses of study, without examination, provided they satisfy the President and professors concerned that they are prepared to take the subjects selected.

For further details in regard to conditions of admission, see pages 28-31 of the University Catalogue.

SESSION.

The annual session opens on the third Wednesday in September, and closes on the first Wednesday in June. The session is divided into two terms. The session of 1909-10 began September 15, 1909, and will end June 1, 1910. The second term will begin Monday, January 24, 1910.

Students will be received at any time during the session, but are advised to enter at the beginning of a term.

Parents are requested to instruct their sons to report for duty at the University as soon as they reach Baton Rouge. A fee of two dollars is charged for registration. This is remitted to students who register during the first three days of the session.

EXPENSES.

Tuition is free to all students from Louisiana; but every student not a bona fide resident of Louisiana is charged an annual tuition fee of sixty dollars ($60.00), payable $30.00 per term in advance.

Every student is charged an incidental fee of $5.00 per session, and a registration fee of $2.00 per session; but the registration fee is remitted for all students who register during the first three days of the session.

Students may board either at the University or in the town. Those who board at the University must be regular cadets, subject to all the rules and requirements of the Military Department, unless excused for special reasons. Those who board in the town will be subject only to such regulations as may be deemed necessary for the preservation of order and good conduct, but, if under twenty-one years of age, may be required to participate in the military drills for three hours per week during their Freshman and Sophomore years. Board in the

LOUISIANA STATE UNIVERSITY—AUDUBON SUGAR SCHOOL.
Main Lecture Hall, Chemical Laboratory.

town costs from $15.00 to $30.00 per month, and washing from $2.00 to $3.00.

Students who board at the University are charged for board $10.00, washing $1.50, and fuel and lights 50 cents per month of four weeks; or $3.00 per week for board, lodging, laundry, fuel and lights. The bedroom furniture is supplied by the University, and each boarder is charged $5.00 per session for its use. Every student who boards at the University must provide himself with four sheets and two blankets for single bed, one pillow, four pillow slips, towels, tooth-brush mug and toilet articles.

Every student who boards at the University is required to pay a surgeon's fee of $5.00, and a medicine and hospital fee of $3.00 per session, which entitle him to medical attendance and medicines in all cases of ordinary sickness. In cases of serious sickness requiring extra service, an additional charge is made to cover the cost of such extra service.

Thus, it will be seen that the total expenses for maintainance per session are:

Board, washing, fuel and lights	$108.00
Surgeon's fee and medicine fee	8.00
Furniture rent	5.00
Incidental fee	5.00
Total	$126.00

Books cost, on an average, about $10.00 per session.

Drawing instruments cost $12.50 per set, and one set is sufficient for the whole course.

LABORATORY FEES.

The following sums are charged for the laboratory work indicated and are intended to cover the cost of the material actually consumed by the student. These fees must be paid before beginning the laboratory work.

Chemical Laboratory 1 and 2, $10.00; Chemical Laboratory 5-6, 7-8, 11-12, $10.00 for six hours or $15.00 for ten or twelve hours.

Mechanic Arts 1 and 2, $5.00; 3 and 4, $8.00; 5 and 6. $8.00; 7 and 8, $10.00; B, $2.50; C, $5.00.

Mechanics Laboratory 1 and 2, Mechanical course, $5.00; Sugar course, $6.00; Electrical Engineering course, $2.00.

Physics Laboratory 2, $2.50; 3 and 4, $5.00.

The figures used above refer to the detailed course of study, which is followed by a description of each of the subjects mentioned therein.

THE SUGAR ENGINEERING COURSE.

The figure to the left of the subject in the following outline of the work of the course indicates the number of hours per week devoted to the subject. The asterisk (*) attached to a figure indicates laboratory work. Three hours of laboratory work are received as equivalent to one hour of regular class work. The bracketed words and figures are the course designations as given in the accounts of departmental work.

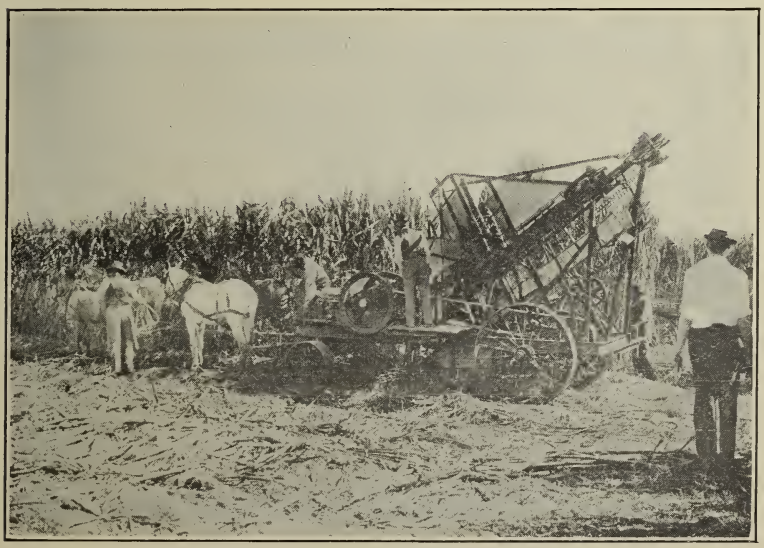
Freshman Class.

3 English (1).	3 English (2).
3 Higher Algebra (Math. 1).	3 Higher Algebra (Math. 2).
3 Solid Geometry (Math. 3).	3 Trigonometry (Math. 4).
3 French (3) or German (3) or Spanish (3).	3 French (4) or German (4) or Spanish (4).
*6 Free Hand Drawing (1).	*6 Projections (Drawing 2).
*6 Joinery (Mech. Arts 1).	*6 Joinery (Mech. Arts 2).

Sophomore Class.

3 Principles of Agriculture (Agronomy 1).	3 Feeds and Feeding (Animal Industry 2).
3 Advanced Algebra (Math. 5).	3 Calculus (Math. 8).
3 Analytical Geometry (Math. 7).	3 Mechanics (Physics 4).
	3 Inorganic Chemistry (2).
3 Inorganic Chemistry (1).	*4 Chemistry, Laboratory (2).
*4 Chemistry, Laboratory (1).	*6 Mechanical Drawing (4).
*6 Mechanical Drawing (3).	*6 Forging (Mech. Arts 6).
*6 Forging (Mech. Arts 5).	*4 Mechanics, Laboratory (Physics 4).

LOUISIANA STATE UNIVERSITY—AUDUBON SUGAR SCHOOL.
Experimental Cane Harvester, Sugar Experiment Station,
Audubon Park, New Orleans.



LOUISIANA STATE UNIVERSITY—AUDUBON SUGAR SCHOOL.
Experimental Cane Harvester, Sugar Experiment Station,
Audubon Park, New Orleans.

Junior Class.

3 Calculus (Math. 9).
3 Theoretical Mechanics (Physics 5).
3 Electricity and Magnetism (Physics 3).
3 Organic Chemistry (3).
*6 Qualitative Analysis (Chem. 5).
1 Kinematics and Graphics (Mech. Eng. 13).
*4 Kinematics and Graphics (Mech. Eng. 13).
3 Descriptive Geometry (Mech. Eng. 1).

3 Calculus (Math. 10) or 3 Direct Current Engineering (Elec. Eng. 2).
3 Heat and Light (Physics 6).
3 Power (Mech. Eng. 2).
3 Organic Chemistry (4).
*10 Qualitative and Quantitative Analysis (Chem. 6).
*2 Experimental Engineering (Mech. Eng. 8).
*4 Applied Design (Mech. Engineering 14).

Fourth Year.

Ten weeks of practical work at Audubon Park. The remaining time devoted to the following courses:

2 Principles of Chemical Analysis (Chem. 7).
4 Thermodynamics (Mech. Eng. 3).
4 Machine Des. (Mech. Eng. 19).
*8 Quantitative Analysis (Chem. 7).
*6 Engineering Design (Mech. Eng. 15).
*4 Experimental Engineering Lab. (Mech. Eng. 9a).

2 Commercial Analysis (Chem. 8).
4 Thermodynamics (Mech. Eng. 4).
2 Sugar House Machinery (Mech. Eng. 20).
3 Power Plants (Mechanical Eng. 6).
2 Organic Industrial Chemistry (10).
*10 Quantitative Analysis (Chem. 8).
*4 Engineering Design (Mech. Eng. 16).
*4 Experimental Engineering Lab. (Mech. Eng. 9b).

Fifth Year.

Ten weeks of practical work at Audubon Park. The remaining time devoted to the following courses:

3 Sugar Mill Plants (Mech. Eng. 21).	3 Sugar Chemistry (Chem. 12).
3 Sugar Chemistry (Chem. 11).	1 Sugar Machine Design (Mech. Eng. 18).
*6 Sugar Machine Design (Mech. Eng. 17).	*6 Sugar Machine Design (Mech. Eng. 18).
*6 Experimental Engineering Lab. (Mech. Eng. 10a).	*6 Experimental Engineering Lab. (Mech. Eng. 10b).
*10 Sugar Chemistry Lab. (Chem. 11).	*10 Sugar Chemistry Lab. (Chem. 12).
2 Sugar Agriculture (Agronomy 5).	2 Sugar Agriculture (Agronomy 6).

DESCRIPTION OF SUBJECTS TAUGHT IN EACH YEAR.

FRESHMAN CLASS.

1. Rhetoric and English Composition.

The chief aim of this course is to help students to acquire the power of writing English clearly and correctly. A text-book is used, but the instruction is based principally upon the study of English masterpieces and the daily exercises of the students. In addition to the writing and rewriting of themes, provision is made, as far as possible, for personal conferences between each student and his instructor. Parallel reading is required.

Three hours a week. First term.

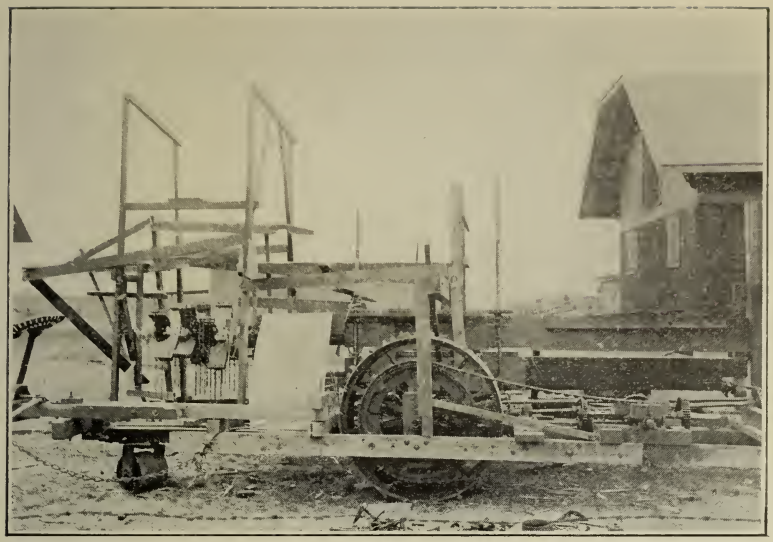
2. Rhetoric and English Composition.

Continuation of course 1.

Three hours a week. Second term.

1. Higher Algebra.

This course includes proportion; variation; arithmetical, geometric, and harmonic progression; the binomial theorem for any rational exponents; the properties of, and computations by, loga-



LOUISIANA STATE UNIVERSITY—AUDUBON SUGAR SCHOOL.
Experimental Cane Harvester, Sugar Experiment Station,
Audubon Park, New Orleans.

LOUISIANA STATE UNIVERSITY—AUDUBON SUGAR SCHOOL.
View in Sugar House, Sugar Experiment Station,
Audubon Park, New Orleans.

rithms; indeterminate linear equations. To enter this course students must have completed elementary algebra through quadratic equations.

Text: Wells' College Algebra.

Three hours a week. First term.

2. Higher Algebra.

This course is a continuation of course 1, and includes inequalities; limits; convergency and divergency of series; undetermined coefficients; partial fractions; reversion of series; continued fractions; and graphic solutions of linear and quadratric equations.

Text: Wells' College Algebra.

Three hours a week. Second term.

3. Solid Geometry.

To enter this course students must understand plane geometry. Much importance is attached to their being able to prove the ordinary theorems, demonstrate simple original propositions, and solve problems relating to the mensuration of polygons and circles.

Three hours a week. First term.

4. Plane, Analytic and Spherical Trigonometry.

To take this course students must have completed course 1.

Text: Nicholson's Trigonometry.

Three hours a week. Second term.

3. Intermediate French.

This course consists of a review of grammar, exercises in writing and speaking French, and the reading of modern French prose.

Text--books: Annotated editions of nineteenth century authors.

Three hours a week. First term.

4. Intermediate French.

The student acquires a good vocabulary, and obtains a fair knowledge of spoken French.

Text-books: The same.

Three hours a week. Second term.

Or,

3. Second Year German.

In the second year of the study of German an effort is made to fix the student's knowledge of German forms and sentence structure permanently, and to make him able to work out by himself the most difficult sentences. The work is chiefly translation, both of prose and poetry. Exercises in grammar, composition, and conversation are continued.

Text-book: Thomas and Hervey's German Reader and Exercise Book.

Three hours a week. First term.

4. Second Year German.

In this course the student spends most of his time in the translation of a German drama.

Text--book: Schiller's Wilhelm Tell, or Lessing's Minna von Barnhelm.

Three hours a week. Second term.

Or,

3. Advanced Spanish.

This course, as far as possible, will be conducted in Spanish; all exercises, written and oral, being intended to give the student a command of the language.

Text-books: Hill and Ford's Spanish Grammar; Nociones de Historia de los Estados Unidos; Alarcon's Novelas Cortas.

Three hours a week. First term.

4. Advanced Spanish.

Continuation of course 3.

Three hours a week. Second term.

1. Free-Hand Drawing.

A course in free-hand drawing from geometrical solids and parts of machinery; lettering; geometrical drawing; elementary projection.

Text-book: Tracy's Elements of Mechanical Drawing.

Six hours a week.

LOUISIANA STATE UNIVERSITY—AUDUBON SUGAR SCHOOL.
Entrance to Sugar Experiment Station, Audubon Park, New Orleans.

LOUISIANA STATE UNIVERSITY—AUDUBON SUGAR SCHOOL.
Cultural Experiments in Sugar Cane, Sugar Experiment Station, Audubon Park, New Orleans.

2. Projections.

Isometric, cabinet and orthographic projections; intersection of solids and development of surfaces; shades, shadows, and perspective.

Six hours a week.

1. Joinery.

In this course the student is taught the uses of the representative tools used in wood-work, and how to sharpen and take care of them. He constructs a graduated series of exercises, embracing the principles of halving together, mortising and tenoning, dovetailing and gluing.

Text-book: Goss's Benchwork in Wood.

Six hours a week.

2. Joinery.

The class is divided into sections of two or more students, and each section constructs some finished product to be used in the shops or some other department of the University.

Six hours a week.

SOPHOMORE CLASS.

1. Principles of Agronomy.

This course includes a study of the elementary principles of soils, field and farm management in their relations to general agriculture. The origin and classification of soils, different methods of cultivation and their effect upon the movement and control of soil water with its ultimate effect upon plant development, benefits of crop rotation and the use of fertilizers, including a study of the Louisiana fertilizer law, are given due consideration in the simplest manner possible.

Text: Fletcher's Soils.

Three hours a week. First term.

2. Feeds and Feeding.

The principal topics discussed under the head of Principles of Feeding are as follows: The relations of plant and animal life, the chemical elements of nutrition, the compounds of ani-

mal nutrition; the digestion of food, the conditions influencing digestion, and the functions of the nutrients. The principal topics discussed under the head of Practice of Feeding are as follows: Commercial feeding stuffs, natural products, valuation of feeding stuffs, and the selection and compounding of rations for work stock, meat production, milk production, growing animals and poultry.

5. Advanced Algebra.

The algebra in this course includes mainly summations of series; interpolation; complex numbers; determinants; and the theory of equations. To take this course students must have completed courses 1 and 2.

Three hours a week. First term.

7. Analytic Geometry.

Three hours a week. First term.

8. Differential and Integral Calculus.

Text: Nicholson's Calculus.

Three hours a week. Second term.

4. Mechanics.

Requisite, Mathematics 4.

This course is designed to meet the requirements of the students in the College of Engineering and others who may desire to continue the study of physics. It includes kinematics, simple harmonic motion, composition and resolution of forces, inertia, force and torque, centrifugal and centripetal force, Newton's Laws, gravitation, power, hydraulics, hydrostatics, properties of gases, and the study of wave motion.

Text-book: Crew's General Physics.

Three hours of recitation and four hours of laboratory work per week. Second term.

1. General Chemistry.

Lecture room demonstration, supplemented by laboratory studies on the type elements and the general laws of chemical action.

LOUISIANA STATE UNIVERSITY—AUDUBON SUGAR SCHOOL.
A New Seedling Cane, Sugar Experiment Station,
Audubon Park, New Orleans.

Text-books: Remsen's College Chemistry; Hillyer's Laboratory Manual; Mason's Qualitative Analysis.

Three hours a week and four hours of laboratory work. First term.

2. General Chemistry.

This course is a continuation of course 1, and includes lectures on the detailed manufacture of fertilizers, sulphuric acid, and the more important inorganic chemical products, as well as a brief course in elementary metallurgy. The laboratory work includes some inorganic preparations and the principles of qualitative analysis.

Three hours a week and four hours of laboratory work. Second term.

3. Mechanical Drawing.

Free-hand lettering; screws, bolts and nuts; detail drawings of steam engine.

Text-books: Reinhardt's Free Hand Lettering; Thorne's Senior Course in Mechanical Drawing.

Six hours a week.

4. Mechanical Drawing.

Detail and assembly drawings of steam engine completed.

Text-book: Thorne's Senior Course in Mechanical Drawing.

Six hours a week.

5. Forging.

The management of the fire and the uses of the various forge tools are taught by having each student to make a set of exercises, including the principles of drawing, bending, forming, twisting, punching, splitting, upsetting, and welding.

Six hours a week.

6. Forging.

Continuation of course 5, and in addition the making of tongs, one or more anvil tools, and a complete set of tools to be used by the student in doing his machine shop work.

Six hours a week.

JUNIOR CLASS.

9. Differential and Integral Calculus.

Text: Nicholson's Calculus.

This course is a continuation of course 8.

Three hours a week. First term.

10. Differential and Integral Calculus.

Text: Nicholson's Calculus.

This course is a continuation of course 9, and includes the application of the calculus to problems in physics and mechanics.

Three hours a week. Second term.

Or,

2. Direct Current Engineering.

Requisite, Physics 3 and 8, and Mathematics 7.

This course aims to familiarize the student with the production, distribution, and application of direct current electricity. The following topics are presented: Elementary electricity and magnetism; the magnetic circuit; the electric circuit; the dynamo as a generator; the dynamo as a motor; electric distribution and wiring; application to the practical industry.

Text-book: Franklin and Esty's Elements of Electrical Engineering.

Three hours a week. Second term.

3. Electricity and Magnetism.

Requisite, Physics 4 and Mathematics 8.

This course treats of magnets and magnetic fields, current, resistance, electromotive force, inductance, capacity, magnetism of iron, galvanometers, and electrolysis.

Text-books: Nichols and Franklin's Electricity and Magnetism; Carhart and Patterson's Electrical Measurement.

Three hours a week. First term.

5. Theoretical Mechanics.

Requisite, Mathematics 8.

An elementary course in theoretical mechanics.

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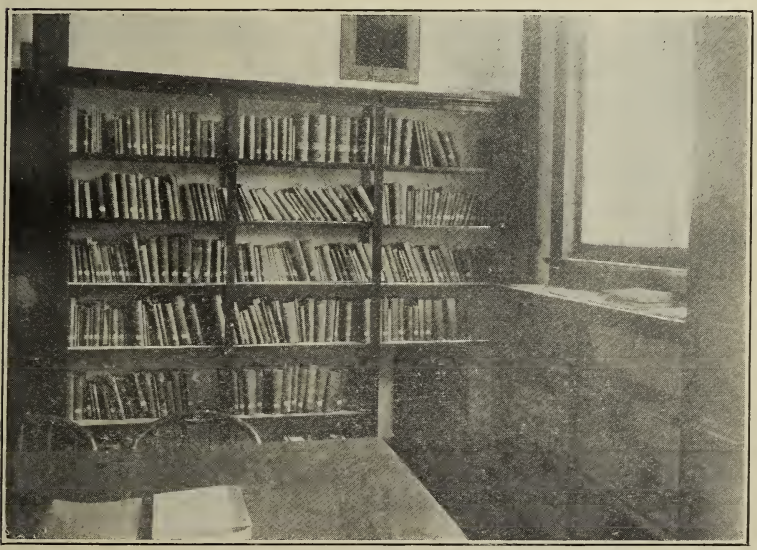
Hill Memorial Library.



LOUISIANA STATE UNIVERSITY—AUDUBON SUGAR SCHOOL.
Corner in Department Library, Chemical Laboratory.

Text-book: Crew's Principles of Mechanics.

Three hours a week. First term.

6. Heat and Light.

Requisite, Physics 4.

This course treats of thermometry, calorimetry, thermodynamics, kinetic theory of gases, reflection, refraction, interference, dispersion, color, and polarization.

Text-book: Crew's General Physics.

Three hours a week. Second term.

3. Organic Chemistry.

This is an elementary course which is designed to meet the requirements of a general cultural course, as well as those of students expecting to enter the engineering courses in which organic chemistry is required or of those expecting to study medicine. It is non-technical in nature, the effort being to stress the purely scientific side rather than its applications. It is believed that this method of approach makes organic chemistry a more efficient working tool for the technologist as well as for all other classes of stuednts. Instruction is given by lecture work illustrated fully by experiments, together with individual work in Organic Preparations.

Text-book: Remsen's Organic Chemistry.

Three hours a week. First term.

4. Organic Chemistry.

A continuation of course 3.

Three hours a week. Second term.

5. Qualitative Analysis.

Laboratory work with one explanatory lecture per week. The purpose of the course is not so much to make a skilled analyst as to teach the fundamental principles on which analytical chemistry is based. Courses 5 and 6 are taken in conjunction. After the student has analyzed thirty unknown salts and mixtures, the study of quantitative analysis is begun, typical gravimetric and volumetric methods being chosen, illustrating the care in manipulation necessary to secure accuracy in

results. This is accompanied by a weekly lecture on the theory of the balance and the various stoichiometric problems brought up in the laboratory work.

Text-books: Dennis and Whittlesey's Qualitative Analysis; Olsen's Qualitative Chemical Analysis; Treadwell's Chemical Analysis, Volume II.

Six to ten hours a week. First term.

6. Qualitative Analysis.

A continuation of course 5.

1. Descriptive Geometry.

A study of the problems relating to the representation, by drawings, of geometrical magnitudes in space.

Text-book: Faunce's Descriptive Geometry.

Three hours a week. First term.

2. Power.

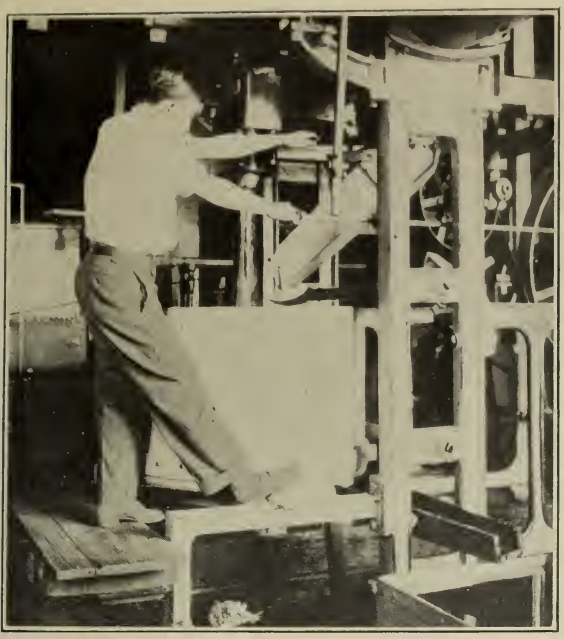
An elementary study of steam engines and boilers, pumping machinery, gas engines, air compressors, hot-air engines, etc. Attention is given to the different types of slide-valves and the solution of problems relating thereto by means of Zeuner diagrams. The study of the steam engine indicator and its use in the determination of the power, steam consumption and steam distribution of engines is taken up. The principles of physics as applied to the transmission of heat from furnaces to water and steam are studied and a working knowledge of the use of steam tables is obtained through the solution of numerous problems.

Text-book: Kerr's Power and Power Transmission.

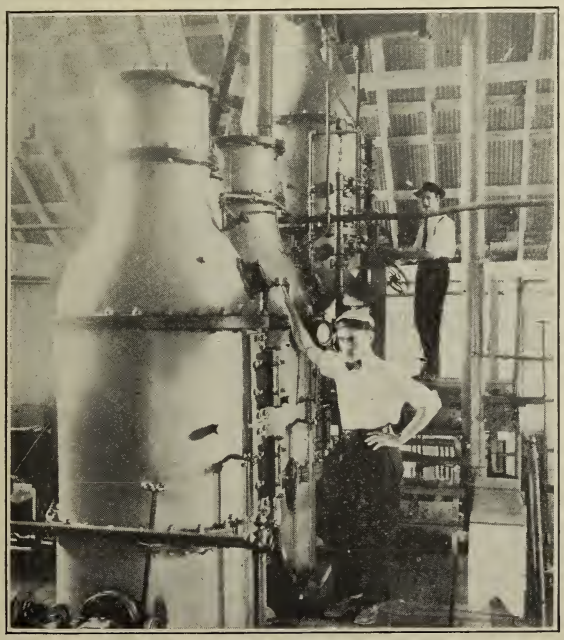
Three hours a week. Second term.

13. Kinematics-Graphics.

This course consists of a study of the motions and forces in machines, principally by graphical methods. The student is taught to analyze the motions and forces of given machines and to arrange for required motions by means of cams, linkwork, quick-return motions, sliding blocks, rolling wheels, etc. Velocity diagrams are made use of.



LOUISIANA STATE UNIVERSITY—AUDUBON SUGAR SCHOOL.
At the "Effects" and "Pan," Sugar Experiment Station,
Audubon Park, New Orleans.



LOUISIANA STATE UNIVERSITY—AUDUBON SUGAR SCHOOL.
"At the Centrifugals," Sugar Experiment Station,
Audubon Park, New Orleans.

The work is done by means of recitations and practice with the drawing board.

Text-book: Smith and Marx's Machine Design.

One hour a week and four hours of drawing board work.

First term.

14. Applied Design.

The principles of the preceding course are applied in the design of two or more simple but complete machines, selected so as to be as comprehensive as possible.

Text-books: Sames' Mechanical Engineering Pocket Book.

References: Smith and Marx's Machine Design; Cambria Hand Book, etc.

Four hours a week. Second term.

8. Experimnetal Engineering.

Must be preceded or accompanied by course 2. Sketching steam-piping and other apparatus in the laboratory; practice in the manipulation and care of condensing and non-condensing steam engines, gas, gasoline and hot-air engines and steam boilers; in the correction of pressure gages; in the use and correction of planimeters; in slide valve setting. Engines are studied with reference to the distribution of steam in the cylinder and errors in valve setting corrected. Elementary tests of the strength of iron and wood are also made.

FOURTH YEAR.

7. Principles of Chemical Analysis.

This course is designed to teach the underlying principles of quantitative analysis. The theory of the balance and its construction, the calibration of volumetric apparatus, the theories of precipitation and solution, stoichiometry and indicators are among the subjects treated. Lectures are also given on the various type processes and their limits of accuracy. The work is accompanied by laboratory illustration and practice.

Text and reference books: Olsen's Quantitative Analysis; Treadwell-Hall's Analytical Chemistry, Volume II; Talbot and Blanchard's Electrolytic Dissociation Theory; Wells' Chemical Arithmetic.

Two hours a week and six to twelve hours of laboratory work. First term.

8. Agricultural and Commercial Analysis.

This course consists of lectures on the general principles of agricultural chemistry, on the technical chemistry of the sugar-house, and on agricultural analytical methods as prescribed by the Association of Official Agricultural Chemists. It includes a course on the theory and use of the polariscope, and is supplemented by laboratory work on the analysis of sugars, fertilizers and agricultural products, and by visits to sugar-houses, gas works, cotton-seed oil works, and such chemical manufacturing plants as may be accessible.

Text-books: The Methods of Analytical Work, published by the A. O. A. C.; Wiley's Agricultural Analysis; Olsen's Quantitative Chemical Analysis.

Two hours a week and six to twelve hours of laboratory work. Second term.

3. Thermodynamics.

This course embraces a study of the theories of the conversion of heat into work, as applied to the steam engine. Steam engine economy is studied by means of the entropy-temperatiure diagram and other graphical methods. The losses of heat in steam engines and methods for preventing the same are discussed.

Different types of steam engines are discussed with reference to their thermodynamic efficiency and calculations are made involving cylinder proportions. The text is supplemented by notes and numerous problems.

Text-book: Reeve's Thermodynamics of Heat Engines.

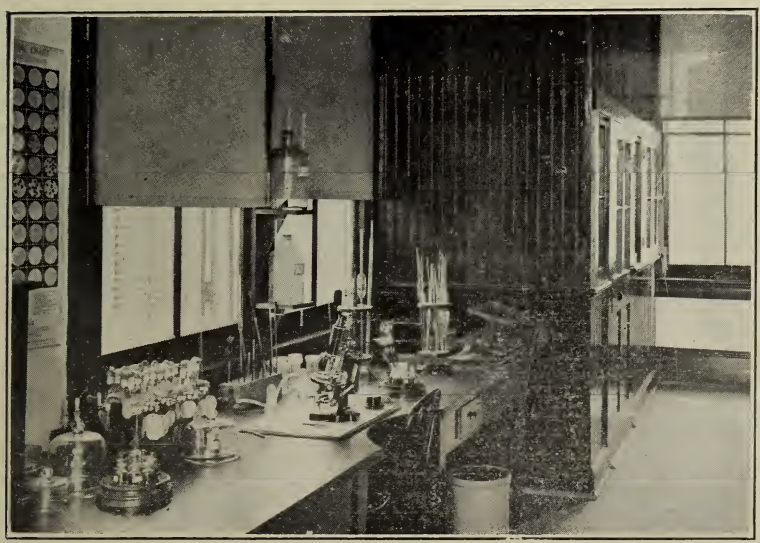
Four hours a week. First term.

4. Thermodynamics.

A continuation of course 3, the same methods being applied in studying the heat theories of the gas engine, the oil engine, the hot-air engine, the air compressor, and refrigerating machines.

Four hours a week. Second term.

LOUISIANA STATE UNIVERSITY—AUDUBON SUGAR SCHOOL.
Nine-roller Mill, Sugar Experiment Station, Audubon Park, New Orleans.



LOUISIANA STATE UNIVERSITY—AUDUBON SUGAR SCHOOL.
Corner in Bacteriological Laboratory, Sugar Experiment Station, Audubon Park, New Orleans.

19. Machine Design.

A text-book study of the materials, calculations, and forms used in the design of the parts of machines, such as beams, columns, springs, riveted joints, journals, shafts, couplings, friction gears, machine frames, etc. The course serves as a basis for work in design at the drawing board.

Text-book: Smith and Marx's Machine Design.

Four hours a week. First term.

20. Sugar House Machinery.

This course consists of two parts: first, a descriptive study of the machinery peculiar to sugar mill plants, such as evaporators, vacuum pans, centrifugals, clarifiers, rollers, shredders, diffusion batteries, etc.; second, the theories of heat as relating to evaporating, cooling and condensing, with special reference to the design of evaporators and vacuum pans. This course is intended as a preparation for sugar machine design. Frequent problems are given, so as to give the students familiarity with the calculations involved.

Text-book: Deerr's Cane Sugar.

References: Foster's Evaporation in Multiple Effects; Hausbrand's Evaporation, Cooling and Condensing; Ware's Beet Sugar Manufacture.

Two hours a week.

9. Experimental Engineering.

(a) Practice in calibrating thermometers and indicator springs; the use of calorimeters in determining the moisture in steam; the use of the indicator in setting the valves of steam engines. The horse-power of steam engines is determined by means of indicators and brakes.

(b) Tests of simple, condensing and non-condensing steam engines and steam turbines in which the power developed is measured, the exhaust steam weighed and the friction and mechanical efficiency determined.

Tests of gas, gasoline and gas producer engines to determine their fuel consumption, and thermal and mechanical efficiencies.

The results of these tests are made use of in determining the setting of carburetters and igniters, the speed, the quantity of jacket water, etc., that will give the maximum economy.

First term.

15. Engineering Design.

This course involves the calculations, design and drawings of complete machines, such as power punches, steam boilers, steam pumps, piping plans for a power plant, etc.

References: Kent's Mechanical Engineer's Pocket Book; Supplee's Mechanical Engineer's Reference Book; Barr's Pumping Machinery; Parson's Steam Boilers, and various works on machine design.

Four hours a week.

16. Engineering Design.

This course is especially intended to train the student in the design of structural details. Such designs as jib cranes, traveling cranes, hoists, etc., are worked out in detail.

References: Cambria Hand Book; Same's Mechanical Engineering, and various catalogues.

Four hours a week.

6. Power Plants.

A study of the economics of power plants, with discussions of the relative economy of steam, gas, and other kinds of power, and the particular conditions best suited to each. The best arrangement of piping systems, auxiliaries, etc., and problems covering the same are worked out. The text is supplemented by the Professor's lectures, and lantern slides are freely used for illustrating current power plant practice.

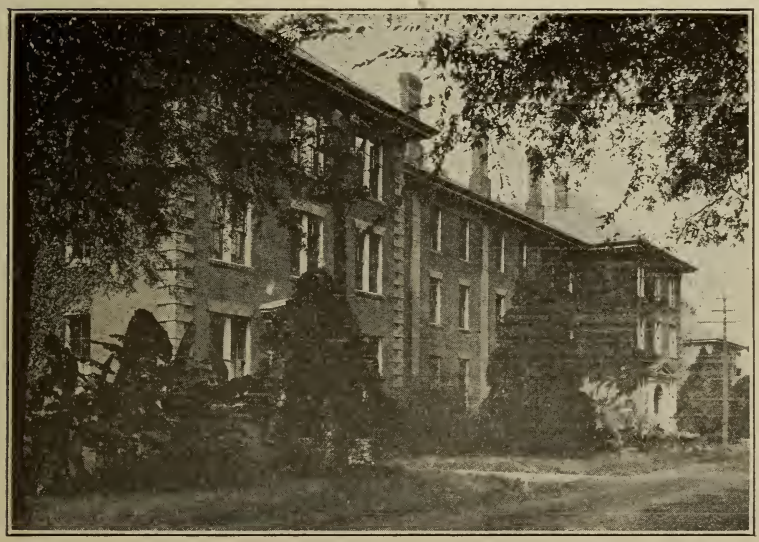
Text-book: Meyer's Steam Power Plants.

Three hours a week. Second term.

10. Organic Industrial Chemistry.

Lectures on the manufacture of cane and beet sugar, on fermentation and industrial alcohol, the chemistry of animal and vegetable fats and oils, particularly cotton-seed oil and its by-products, and selected topics of a like nature. This course is

LOUISIANA STATE UNIVERSITY—AUDUBON SUGAR SCHOOL.
View on the University Grounds.



LOUISIANA STATE UNIVERSITY—AUDUBON SUGAR SCHOOL.
Foster Hall, Dormitory.

accompanied by visits to cotton oil mills, sugar-houses, gas works and such other instances of chemical technology as may be available.

Text-books: Thorp's Industrial Chemistry and Bulletins of the Louisiana State Experiment Stations.

Two hours a week. Second term.

FIFTH YEAR.

21. Sugar Mill Plants.

A study of the economics of the sugar mill as a whole. Attention is given to the general arrangement of the plant, pipe systems and coverings, arrangement of machinery and auxiliaries for best economy, etc. The question of fuels and their bearing upon the efficiency of the plant is also discussed, and calculations relating to the same are made.

The course is carried on from the professor's notes and by reference to various works on the subject.

Three hours a week.

5. Veterinary Science.

Hygiene of Sugar Plantation Work Stock.

This is a short course in veterinary science for students of the sugar course. The object here is to educate the student along the lines of animal hygiene so that he may have an intelligent idea of how to maintain the most perfect health and usefulness in the plantation work stock.

Three hours a week. Second term.

11. Advanced Organic Chemistry of the Sugars.

Lectures on the chemistry of the carbohydrates, the albuminoids, and the amides, supplemented by laboratory work in ultimate organic analysis; the preparation and optical and chemical study of the various sugars, and such problems in the chemistry of the sugar-house as may arise from time to time.

This course is offered to the students in the fifth year of the Audubon Sugar School, and is open to students from other institutions whose training in general, organic and analytical chemistry is sufficient to enable them to take the work profitably.

Three hours a week and six to fifteen hours of laboratory work. First term.

12. Advanced Organic Chemistry.

A continuation of course 11. Courses 11 and 12 are designed to introduce the student to those lines of reading in advanced organic chemistry and scientific sugar technology which may enable him to keep fully abreast of the latest advances in these fields of investigations. Research work is not demanded, but the methods of research are continually emphasized and minor research problems are worked out as fully as the time will permit.

The following books are recommended as texts: Rolfe's The Polariscope; Spencer's Handbook for Cane Sugar Chemists; Prinsen Geerleg's Cane Sugar and Its Manufacture.

Three hours a week and six to fifteen hours of laboratory work. Second term.

17. Sugar Machinery Design.

Calculations and drawings of one or more of the most important machines in sugar houses, such as sugar mills, multiple effect evaporators, clarifiers and vacuum pans. This design is carried on in connection with course 20.

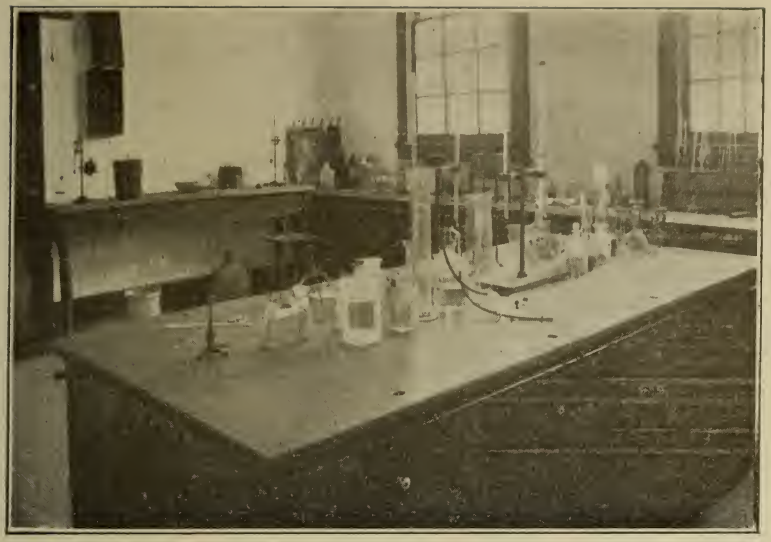
References: Deerr's Cane Sugar; Hausbrand's Evaporation, Cooling and Condensing, and various catalogues.

Six hours a week.

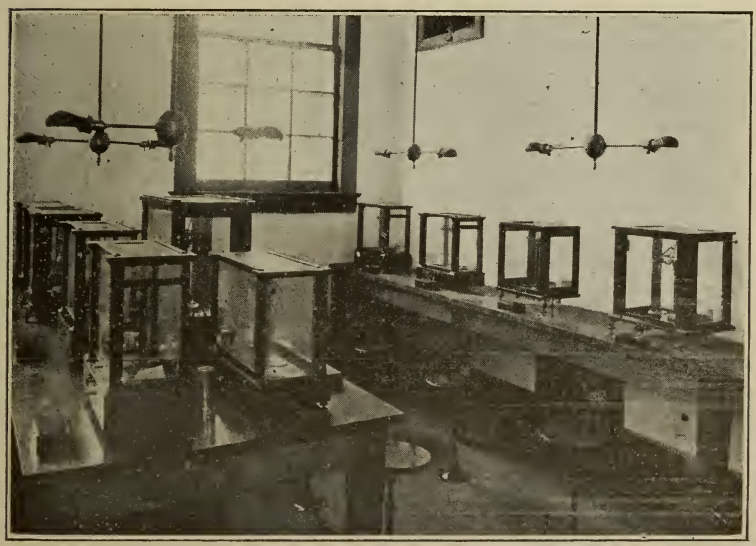
18. Sugar Machinery Design.

This course involves the calculations and layout of the machinery for a complete sugar mill plant. The work is carried on by means of data possessed by the department and by reference to various catalogues and authorities on the subject. The course affords a means of application of all the principles in the preceding courses.

One hour recitation and six hours drawing room work.



LOUISIANA STATE UNIVERSITY—AUDUBON SUGAR SCHOOL.
Corner in Laboratory for Agricultural Chemistry.



LOUISIANA STATE UNIVERSITY—AUDUBON SUGAR SCHOOL.
Corner in Balance Room, Chemical Laboratory.

10. Experimental Engineering.

(a) Tests to determine the evaporative capacity and efficiency of boilers under different conditions; the determination of the efficiency of steam, hot-air and power pumps under different conditions of head and speed; efficiency tests of injectors, air compressors, pipe coverings, etc. In addition to the work in the laboratory, visits are made to plants in the city and to sugar mills in the vicinity and tests of various kinds made.

(b) Tests of the strength of materials for the purpose of giving the student a knowledge of the normal properties of the materials of construction. This work accompanies course 12, the theories there learned being verified by actual experiment. Tests in tension, compression, shear and bending are made on such materials as iron, steel, wood, cement, stone, concrete, etc., for the purpose of determining the ultimate strength, elastic limit, elongation, contraction, etc. Practice is given in the economic proportioning of concrete. Hydraulic experiments are made to determine the flow of water through orifices, nozzles, various pipe fittings, pipes, etc. Water meters are checked and weirs calibrated. Water motors are also experimented upon for the purpose of determining the power developed and the quantity of water used.

Text-book: Smart's Laboratory Practice.

References: Carpenter's Experimental Engineering, Johnson's Materials of Construction, and Slocum and Hancock's Strength of Materials.

In addition to the above, all fifth year men in the Sugar Course are required to take charge of the night runs of the University heating and lighting plant for a period of ten days.

Second term.

5-6. Sugar Agriculture.

Requisite, Agronomy 1 and Chemistry 1.

Includes a general study of the methods of producing sugar cane and sugar beet crops, in the leading sugar countries, special attention being given to a study of cane production in Louisiana. Effort is made to have the course touch on all the

agricultural problems that must be dealt with in the management of a plantation devoted to cane culture.

Text: Sugar Cane, Vol. I, by W. C. Stubbs, supplemented by reading and by lectures from the instructor.

Two hours a week, during the first term except during the grinding season, and two hours a week during the entire second term.

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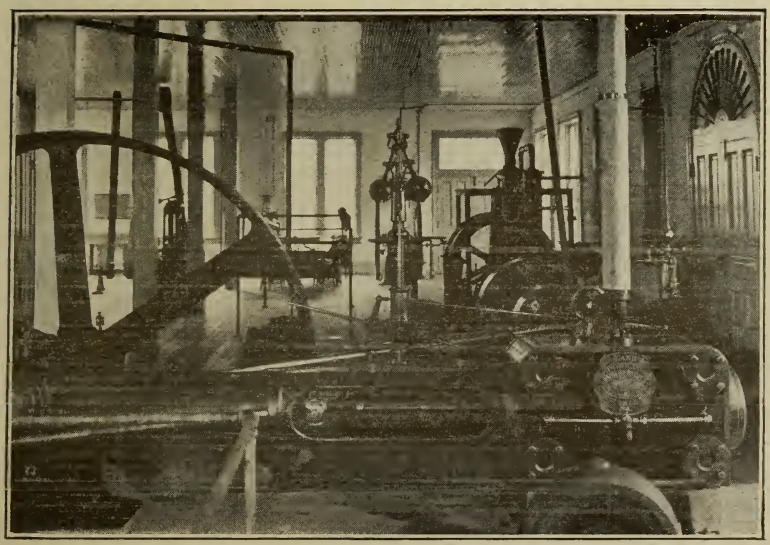
View in Engineering Laboratory.



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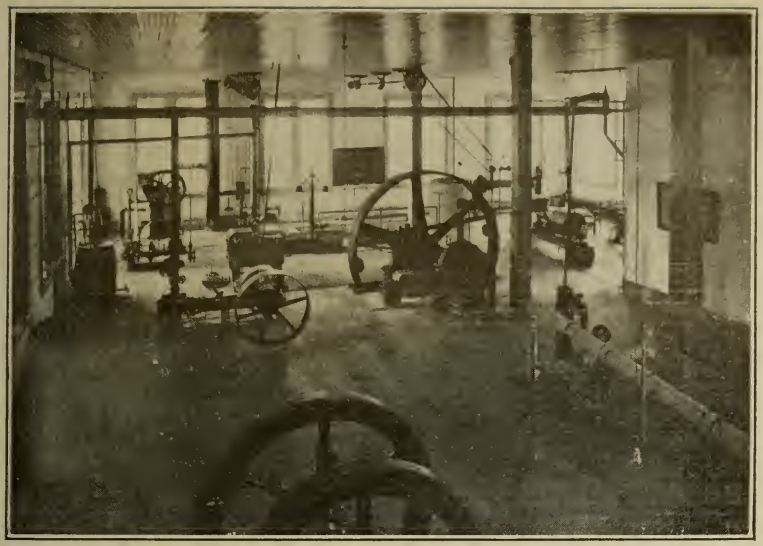

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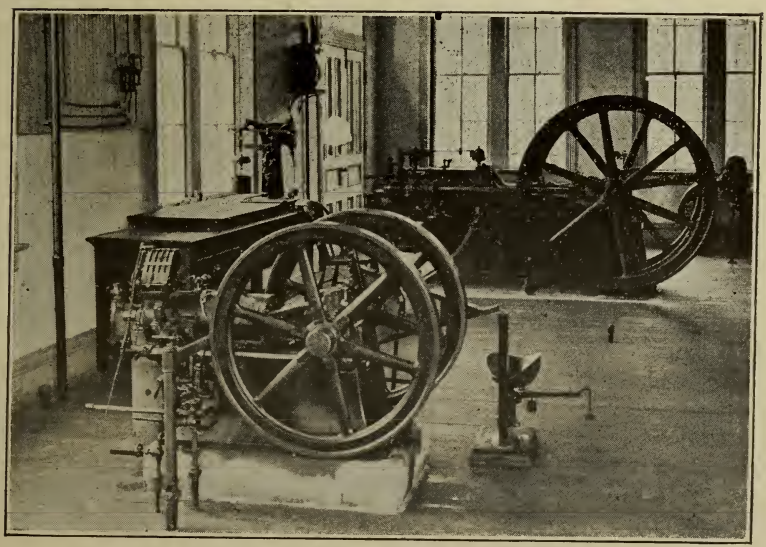
View in Engineering Laboratory.



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View in Engineering Laboratory.